Cross Cutting Management Issues

Construction Cost Trends

Rising cost trends are affecting the highway construction industry in general and WSDOT in particular. Since 2004, the construction industry has experienced price spikes for materials such as steel, asphalt and concrete. Highway construction is heavily dependent on these materials, and the industry has experienced inflation at levels higher than many other fields of construction. Additionally, fuel prices have increased significantly and highway construction often requires contractors to use large amounts of fuel to transport materials and equipment to the worksite as well as to power construction equipment. Other contributing factors to escalating construction costs include the number of project bidders WSDOT can attract and labor costs. This is particularly true in the Puget Sound region, where large public and private construction programs are competing with WSDOT for contractors.

Calculating the Construction Cost Index

WSDOT prepares construction cost estimates using historical information about market conditions drawn from recent bids. Like other state DOTs, WSDOT must extrapolate for the future based on past records. WSDOT accumulates construction cost information and calculates a Construction Cost Index (CCI). The CCI is then compared to the experiences of other western states. WSDOT's CCI is a composite of unit price information from low bids on seven of the most commonly used construction materials, which include Portland Cement Concrete, Structural Concrete, crushed surfacing material, roadway excavation, Hot Mix Asphalt (HMA), Rebar, and Structural Steel.

These items reflect a composite cost for a completed item of work and include the costs of labor, equipment, and materials. For previous reporting on WSDOT's CCI, please visit the Gray Notebook subject archives at: http://www.wsdot.wa.gov/Accountability/GrayNotebook/SubjectIndex.htm.

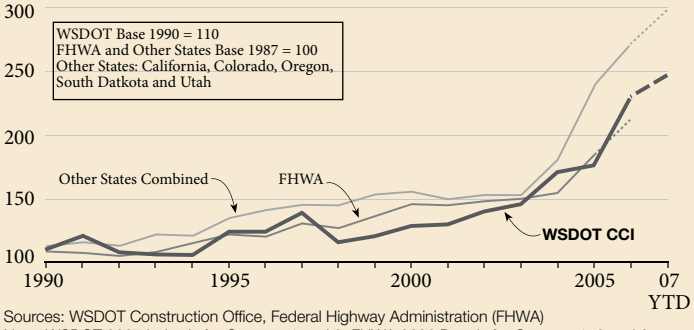
Construction Cost Index Increases by 7% in the First Half of 2007

The graph above to the right illustrates the past 17 years of CCI data for Washington State. This is plotted against the CCI of the Federal Highway Administration (FHWA) and a line representing the combined CCIs of several nearby western states: California, Colorado, Oregon, South Dakota and Utah.

The average annual growth rate of the CCI held steady at about 1.5% per year from 1990 through 2001. Beginning in 2002 and continuing through 2005, the growth rate increased to 8% per year. In 2006, WSDOT's CCI increased 30% over 2005. WSDOT's CCI has increased 7% in the first two quarters of 2007 over the annual average for 2006, from 228 to 245.

Of the seven materials WSDOT tracks in the CCI, Hot Mix Asphalt (HMA) comprises 48.5%, or almost half the weight of the index. HMA prices increased 9% during the first two quarters of 2007.

Construction Cost Indices
Washington State, FHWA, and Other States

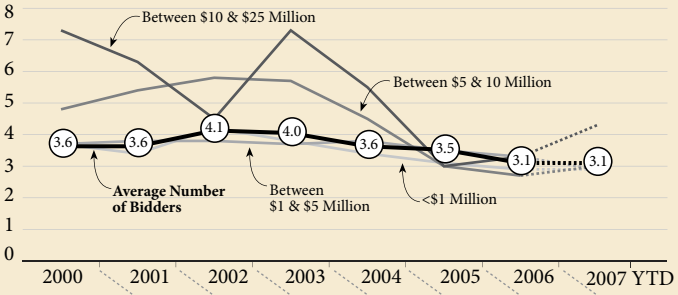


Sources: WSDOT Construction Office, Federal Highway Administration (FHWA)
Note: WSDOT 2007 Index is for Quarters 1 and 2; FHWA 2006 Data is for Quarters 1, 2 and 3; Other States 2007 Data is for the First Quarter.
Note: 2003 and 2004 WSDOT CCI data points adjusted to correct for spiking bid prices on structural steel.

Average Number of Bidders Unchanged from 2006 Levels

WSDOT's goal is to have three or more bidders for each highway construction project. However, large public and private construction programs in Washington State are contributing to a trend of fewer contractors submitting bids for WSDOT projects. This reduction in bidding competition demonstrates that contractors have greater choice in how often they submit

Average Number of Bidders
By Size of Contract



	2000	2001	2002	2003	2004	2005	2006	2007 YTD
1 Bidder	7.7%	12.3%	12.6%	8.5%	13.4%	9.2%	10.3%	9.5%
2 Bidders	26.1%	23.2%	22.2%	17.6%	20.4%	22.0%	37.6%	37.1%
3 Bidders	23.9%	23.2%	15.6%	24.2%	22.5%	33.3%	19.7%	25.7%
More than 3 Bidders	42.3%	41.2%	49.6%	49.7%	43.7%	35.5%	32.5%	27.6%

Data Source: WSDOT Construction Office.

Construction Cost Trends

bids for WSDOT projects, and the types of projects they bid on. Unfortunately, a reduction in bidding competition tends to lead to higher bid prices for WSDOT.

The average number of contractors bidding on each WSDOT project during the first two quarters of 2007 remained unchanged from the 2006 annual average of 3.10. The percentage of WSDOT projects with four or more bidders decreased slightly while the percentage of WSDOT projects with three bidders slightly increased. The percentage of projects with one or two bidders remained relatively flat compared with 2006.

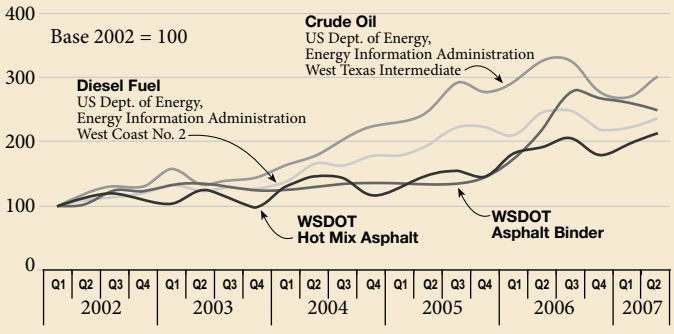
WSDOT closely follows the experiences of other owners in Washington to get a sense of the bidding climate in the state. According to an article featured in the *Puget Sound Business Journal* in April, due to the high volume of work in Washington local contractors are choosing not to bid on work for public agencies, which typically have more regulations than private sector work. In January, a $40 million Western Washington University academic instruction center attracted just one bidder. The bid came in nearly 14% above the engineer's estimate. In March, Sound Transit received just one bid for a light rail station at Seattle-Tacoma International Airport. The bid was approximately 60% above Sound Transit's estimate.

Oil Prices Influence Construction Costs

Crude oil prices and refining trends have a large impact on the cost of WSDOT projects. From the fuel that runs equipment and transports materials to the job site, to the asphalt binder in pavement, the price of crude oil and ultimately the price of these refined products account for a significant portion of WSDOT project costs. The relationship between Hot Mix Asphalt (HMA) and crude oil prices is especially significant as virtually every activity necessary to produce and place a ton of HMA is highly dependant on petroleum products. Mining, crushing, hauling, stockpiling, and drying the aggregates all require fuel. Liquid asphalt used as a binder for HMA is derived from crude oil. Finally, the hauling of the mix to the site and the work to place and compact the asphalt also require petroleum products.

Hot Mix Asphalt (HMA) prices typically follow a similar pattern to the price of crude oil and diesel fuel and in the last few years, prices have increased significantly for petroleum based products from gasoline to PVC plastics. During the second quarter of 2007, price increases for refined products like asphalt and gasoline outpaced crude oil price increases. This was due to demand for these distilled products and refinery capacity to produce them. The recent spike in asphalt prices may be due to lowered refinery utilization, as well as refiners processing different types of crude oil that produce less asphalt.

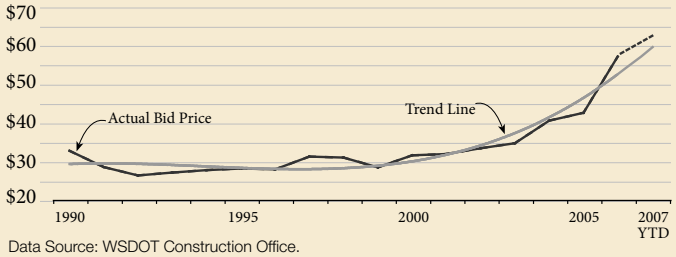
WSDOT Asphalt, Crude Oil and Diesel Fuel Indices



Data Source: Asphalt: WSDOT Construction Office
Diesel Fuel: US Dept. of Energy - Energy Information Administration, West Coast No. 2
Crude Oil: US Dept. of Energy - Energy Information Administration, West Texas Intermediate

Hot Mix Asphalt Unit Bid Price

Dollar/Ton



Data Source: WSDOT Construction Office.

Construction Labor Costs Rising

Labor costs contribute roughly 40% to contractor costs to the delivery of a typical WSDOT highway construction project. Until recently, labor contract negotiations focused on benefits packages for union members, leaving wages flat. However, 2006 and 2007 negotiations brought significant annual increases to a number of trades commonly employed in the construction of a typical WSDOT project. Increases indicate that Washington State's construction activity is strong and demand for skilled construction labor may outpace supply.

Seattle's labor market made national news during the Summer of 2006 concrete workers' strike that delayed several major projects in the Seattle area including Sound Transit's light rail. In May, Seattle was in the headlines again as the contrac-

Construction Cost Trends

tor's trade association (AGC) negotiated contracts for cement masons, operators, laborers, carpenters and Teamsters working on the west side of the state.

Typically, average annual wage and fringe benefit increases have been around 3.5 % in the Seattle area. This year's negotiations brought annual increases in the range of 5% to 6% for all trades. The *Engineering News Record*, a leading construction industry periodical, reported that the cement masons and laborers settled for five year pacts with increases of 5.5% in the first year, 5 % in the second year and 5 % in the third year with re-openers for wage negotiations in the fourth and fifth years. Carpenters and operating engineers negotiated increases of 6%, 5.5% and 5% the first three years, while Teamsters agreed to increases of 5.5% the first two years and 5% the third year.

In addition to the increased cost of skilled construction labor, the demand for construction labor could outpace supply, leading to further cost increases as some contractors could face a "premium charge" to retain qualified workers. WSDOT expects the higher cost of construction labor to lead to higher overall costs for WSDOT projects as contractors build the cost of labor into their bids.

Background on Refinery Challenges

Unplanned refinery outages earlier this year had a significant effect on all refined products nationwide. Though refineries are now operating at closer to full capacity, demand for fuels continues to rise. At the same time some refineries are scaling back, delaying or cancelling projects planned to increase refinery capacity due to the high cost of construction materials and labor. Cost increases for steel, cement, labor and the higher fuel costs to run construction machinery have forced refiners to cancel expansion projects. Last fall, Tesoro Corp. canceled a 25,000-barrel-per-day expansion project planned for a plant in Anacortes, Washington.

Further, crude oil and gasoline prices have reached new highs that could make it economically feasible for refiners to make huge investments in technologies that would allow them to further break down heavier crude oil distillates into lighter fuels. The technology, known as "cracking" enables refiners to break apart the long petrochemical molecular chains found in asphalt oil into smaller pieces capable of being refined into higher-end products like gasoline. The technology is appealing to refineries because it allows them to add significant capacity for lucrative products without the permitting that would be required to construct a new refinery. No new refineries have been constructed in the United States since 1976, largely due to environmental permitting regulations. WSDOT is unaware of any refineries in Washington that are considering investing in the technology, however it is unknown what affect the increased use of this technology around the United States would have on asphalt prices nationwide or in local areas.

Cross Cutting Management Issues

Construction Cost Trends: Applying New Strategies

WSDOT Utilizes New Strategies to Attract Bidders

When contractors bid on WSDOT projects, they estimate the potential future cost of building materials and build that risk into their bid. This results in higher bids from contractors when the construction materials market is volatile, as it is now. The volatile market for construction materials makes it especially difficult for contractors bidding on large projects that may take years to construct because contractors are at risk to lose money if their bids underestimate the future costs of materials. Even contractors bidding on shorter duration jobs face underestimating costs in today's market of escalating costs for construction materials.

Use of the HMA Escalation Clause

Hot Mix Asphalt (HMA) prices are of particular concern since they have increased 34% in 2006, and 9% during the first two quarters of 2007. This increase in price prompted WSDOT to implement a HMA Escalation Clause in September 2006.

WSDOT, with advice from the Washington Asphalt Paving Association (WAPA), implemented a Hot Mix Asphalt Escalation Clause on multi-year projects statewide. The escalation clause is designed to transfer some of the cost escalation risk from the contractor to the state, therefore reducing the effect of cost uncertainty on contractor's bids. WSDOT's goal is for contracts containing the clause to have low bids submitted by contractors for HMA less than 10% above unit bid price for the side of the state the contract takes place in during the quarter the project was awarded. WSDOT and WAPA anticipate this will result in contractors submitting lower bids, and ultimately lower overall project costs for the state, because contractors would no longer have to inflate their HMA bids out of fear of under-estimating future market prices. The second goal is to make contractors less vulnerable to losses due to sudden increases in market prices of HMA. WSDOT is using a similar escalation clause for fuel prices on select multi-year jobs that have similar risks for fuel price increases and inflated contractor bids due to fuel cost uncertainty.

To date, WSDOT has awarded eight contracts containing the clause. The table below compares the average unit bid price submitted by the contractor to the average unit bid price for the western or eastern side of the state during the quarter the project was awarded. Bid prices on all but one project came within the threshold, while more than half the projects containing the clause came in below the average price. No price adjustments have been made to date on contracts containing the clause.

WSDOT is taking additional steps to make projects more attractive to contractors. WSDOT implemented a similar clause on a few multi-year projects to address concerns about rising fuel costs. Additionally, WSDOT looks for ways to make projects more attractive to contractors by bundling smaller, similar projects into larger contracts, and in some cases breaking up very large projects into smaller contracts. WSDOT is currently using the strategy of breaking up a large project on the I-405 corridor congestion relief project, which is being bid as many smaller contracts.

WSDOT Projects Utilizing the Hot Mix Asphalt Escalation Clause, October 2006 - June 2007

Project Name	Tons Awarded	HMA Price/ton	Quarter Average Price/Ton	% Difference
SR 20, Sidney Rd to Scenic Heights	17,450	$66.45	$67.85	-2%
SR 20, Fredonia to I-5	56,062	$54.02	$64.26	-19%
SR 502, I-5 Interchange	55,671	$57.13	$64.26	-12%
SR 9, Schloman Rd to 256th St	19,290	$59.92	$64.26	-7%
SR 539, Horton Rd to Tenmile Rd	68,990	$76.03	$67.95	12%
US 395, North Spokane Corridor – Freya to Farwell	36,412	$59.55	$57.48	4%
SR 304 Downtown Bremerton Pedestrian Access Improvements	5,960	$71.26	$67.95	5%
I-5 Rush Rd to 13th St – Add Lanes	134,105	$58.50	$67.95	-14%

Source: WSDOT Construction Office